Install Raspbian (monitor, keyboard, and mouse)

* Username: pi (default)
* Password: raspberry (default)

Setup a static IP address (<https://pihw.wordpress.com/guides/direct-network-connection/>)

* sudo ifconfig eth0 169.254.0.2
* hostname -I (check if it worked)
* Saving the new configuration
  + sudo cp /boot/cmdline.txt /boot/cmdline.normal (copy of the original file)
  + sudo nano /boot/cmdline.txt (edit the original file)
  + Add at the end of the long line ip=169.254.0.2 (add a space between the last item and “ip=169.254.0.2”)
  + Crt+x and y (to save and exit)
  + sudo cp /boot/cmdline.txt /boot/cmdline.direct (copy of the new file)
  + sudo reboot (next time the IP address will be automatically set)

Update Raspbian

* sudo apt-get update (fetches the list of available updates)
* sudo apt-get upgrade (strictly upgrades the current packages)
* sudo apt-get dist-upgrade (installs updates, new ones)

TCP vs UDP (<http://pymotw.com/2/socket/udp.html>)

* TCP (ensuring that all of the data is transmitted in the right order)
* UDP (delivery is not guaranteed, faster than TCP, single packet = only hold 65,507 bytes)

PuTTY and WinSCP (<http://www.putty.org/> & <http://winscp.net/eng/download.php>)

* The PuTTY program is to use Linux on another computer using the IP address.
* WinSCP is another good program to transfer files between them.

GitHub (<https://github.com/thiagopuga/Project.git>)

Setup a remote desktop for Raspberry Pi (<http://www.raspians.com/knowledgebase/?knowledgebase=setting-up-a-remote-desktop-view-the-pi-on-your-windows-pc/>)

* Install Xming on Windows (<http://sourceforge.net/projects/xming/>)
* "C:\Program Files (x86)\Xming\Xming.exe" :0 -clipboard -rootless -screen 0 800x600+100+100@1 (set window size on the shortcut, +100+100 is the window`s position on the screen)
* Install PuTTY on Windows (<http://www.putty.org/>)
  + Run PuTTY.
  + Select SSH as the connection type
  + Enter in your Pi’s IP address as the Host Name
  + The port should be 22 unless you know better
  + In PuTTY`s option tree, select Connection/SSH/X11
  + Check the box labelled Enable X11 forwarding
  + Go back to Session options (in the option tree)
  + If you would like to save these settings, type a name in the Saved Sessions box and click Save
  + Click Open
  + Once you have logged into the Pi type startlxde and you will see the desktop of your Raspberry in the Xming window (the Xming must be running on Windows)

GPS (<http://blog.mostlyrobots.net/2014/07/07/raspberry-pi-stratum-1-ntp-server/>)

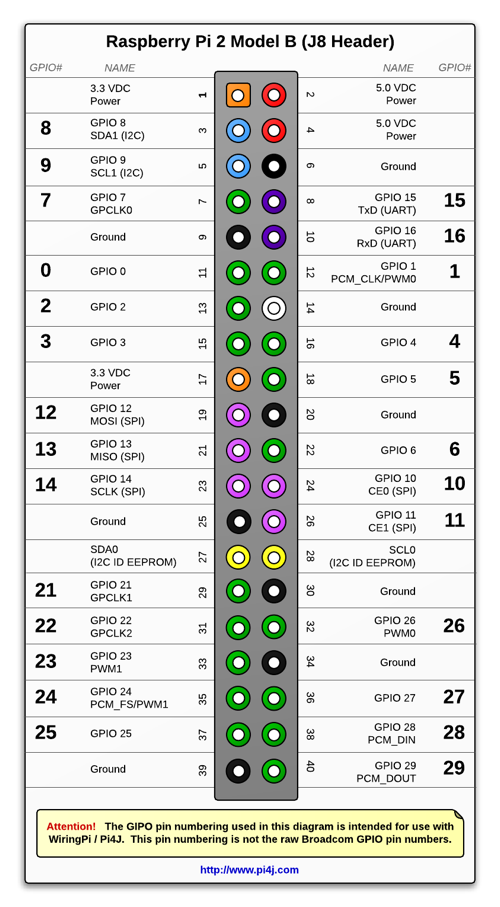
* Connect VIN to +5V (<http://pi4j.com/pins/model-2b-rev1.html>)
* Connect GPS TX (data out from GPS) to Raspberry Pi RX (data into Raspberry Pi)
* Connect GPS PPS (data out from GPS) to Raspberry Pi PCM\_CLK (GPIO 1, data into Raspberry Pi)
* Connect GND to Ground
* sudo nano /boot/cmdline.txt
  + Remove *console=ttyAMA0,115200 kgdboc=ttyAMA0,115200* and save
* sudo nano /etc/inittab
  + Use # to comment out the line *T0:23:respawn:/sbin/getty -L ttyAMA0 115200 vt100*
* sudo reboot
  + sudo cat /dev/ttyAMA0 (test the GPS NMEA)
* Install gpsd
  + sudo apt-get install gpsd gpsd-clients python-gps
  + sudo gpsd /dev/ttyAMA0 -F /var/run/gpsd.sock (start the communication)
  + sudo cgps –s (test if it receives GPS data)
* Configure gpsd to auto start
  + sudo dpkg-reconfigure gpsd
  + The configuration program will ask you a series of questions:
    - Start gpsd automatically? Yes
    - Should gpsd handle attached USB GPS receivers automatically? No
    - Device the GPS receiver is attached to: /dev/ttyAMA0
    - Options to gpsd: -n
    - gpsd control socket path: /var/run/gpsd.sock
  + sudo reboot
  + sudo cgps –s (you should get the same output as before. this shows everything is starting up correctly on boot)
* Configure NTP
  + sudo cp /etc/ntp.conf /etc/ntp.old.conf (make a backup)
  + sudo nano /etc/ntp.conf
    - Use # to comment out the line *restrict -4 default kod notrap nomodify nopeer noquery*
    - Add these lines:  
      *# Server from shared memory provided by gpsd  
      server 127.127.28.0 minpoll 4 maxpoll 4  
      fudge 127.127.28.0 time1 0.150 refid GPS*
  + sudo /etc/init.d/ntp restart
  + sudo ntpq -p –n
* Install user mode PPS module (<http://vanheusden.com/time/rpi_gpio_ntp/>)
  + sudo wget http://vanheusden.com/time/rpi\_gpio\_ntp/rpi\_gpio\_ntp-1.5.tgz
  + sudo tar -zxvf rpi\_gpio\_ntp-1.5.tgz
  + sudo cd rpi\_gpio\_ntp-1.5
  + sudo make install
  + sudo nano /etc/rc.local
    - Add the following line (BEFORE the “exit 0” statement): */usr/local/bin/rpi\_gpio\_ntp -N 1 -g 18*
    - This assumes that the PPS signal of the GPS is connected to GPIO pin 18, which is physical pin 12
    - This program was made for Raspberry Pi Model B 2. So, we need to adapt which pin to use in our Raspberry Pi Model B 2 +)
    - <http://www.element14.com/community/docs/DOC-73950/l/raspberry-pi-2-model-b-gpio-40-pin-block-pinout>
  + sudo rpi\_gpio\_ntp -g 18 –d (test PPS signal)
* Add the PPS configuration to NTP
  + sudo vi /etc/ntp.conf
    - Add these lines:  
      *# Server from PPS module   
      server 127.127.28.1 minpoll 4 maxpoll 4 prefer  
      fudge 127.127.28.1 refid PPS*
  + sudo /etc/init.d/ntp restart
  + sudo ntpq -p –n

GPS Time UTC

* <https://github.com/thiagopuga/Project/tree/master/GPS> (GitHub)

Reading analog-to-digital

* Use a analog-to-digital converter (ADC)
  + MCP3008 VDD -> 3.3V
  + MCP3008 VREF -> 3.3V
  + MCP3008 AGND -> GND
  + MCP3008 CLK -> SCLK
  + MCP3008 DOUT -> MISO
  + MCP3008 DIN -> MOSI
  + MCP3008 CS -> CE0
  + MCP3008 DGND -> GND
* <https://github.com/thiagopuga/Project/tree/master/ADC> (GitHub)



Amazon Web Services‎ (AWS, <http://aws.amazon.com/>)

* Email: [s3laws@gmail.com](mailto:s3laws@gmail.com)
* Password: s3ls3ls3l
* Configuring the server (<http://imjustinbraun.com/aws-setup-lamp-serve/>)
* PuTTYgen (<http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>)
* Host name (or IP address)
  + ec2-user@ec2-52-27-186-72.us-west-2.compute.amazonaws.com
* Connect using PuTTY (<https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/putty.html?console_help=true>)

MySQL

* mysql -u root –p (login)
* Password: raspberry
* Database: pi